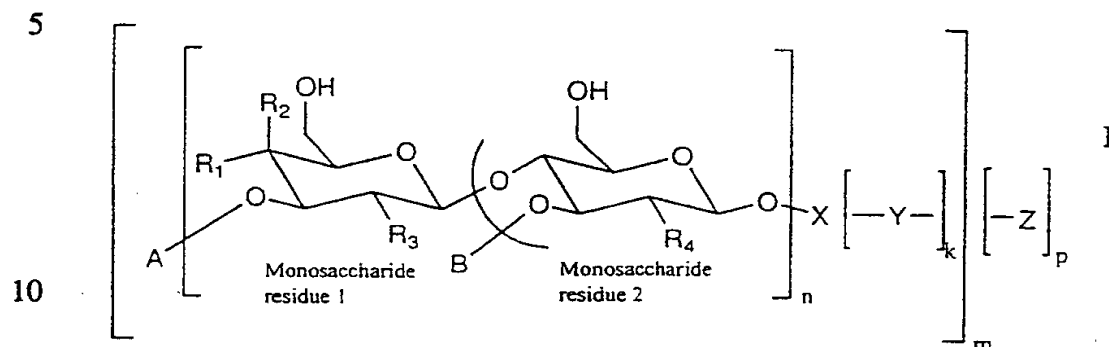


## Claims

## 1. Oligosaccharides having the formula



wherein A is H or a glycosidically  $\beta$ 1-3 linked D-glucopyranosyl residue (Glc $\beta$ 1-3),  $R_1$  is OH,  $R_2$  is H and  $R_3$  is OH or acylamido, -NH-acyl (*i.e.* monosaccharide 1 is Glc, or GlcNAcyl) or  $R_1$  is H,  $R_2$  is OH and  $R_3$  is acetamido -NHCOCH<sub>3</sub> (*i.e.* monosaccharide 1 is GalNAc), B is H, or an  $\alpha$ -L-fucosyl or an  $\alpha$ -L-fucosyl analogue, and  $R_4$  is OH or acetamido -NHCOCH<sub>3</sub> (*i.e.* monosaccharide 2 is optionally fucosylated Glc or GlcNAc), the curved line between the saccharide units indicating that the monosaccharide 1 is  $\beta$ 1-4 linked to monosaccharide 2 when B is linked to the position 3 of the monosaccharide 2, and the monosaccharide 1 is  $\beta$ 1-3 linked to monosaccharide 2 when B is linked to the position 4 of the monosaccharide 2, monosaccharide 1 is GalNAc only when monosaccharide 2 is Glc, n is 1 to 100, with the proviso that there is always at least one  $\alpha$ -fucosyl or  $\alpha$ -fucosyl analogous group present in the molecule, and

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i) p and k are 0 and m is 1, in which case X is H, an aglycon residue or a monosaccharide selected from the group consisting of Glc, GlcNAc, Gal or GalNAc, optionally in reduced form, or oligosaccharide containing one or more of said monosaccharide units, the monosaccharide 2 being  $\beta$ 1-2,  $\beta$ 1-3,  $\beta$ 1-4 or  $\beta$ 1-6 linked to saccharide X, with the proviso that X is not H when both monosaccharides 1 and 2 are GlcNAc, B is L-fucosyl and n is 1, or

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ii) p is 1, k is 0 or 1 and  $1 \leq m \leq 1000$ , in which case X is a straight bond, or a

mono- or oligosaccharide as defined under i),

Y is a spacer or linking group capable of linking the saccharide 2 or X to Z,

and Z is a mono- or polyvalent carrier molecule.

5 2. The oligosaccharides according to claim 1, characterized in that B is  $\alpha$ -L-fucosyl.

3. The oligosaccharides according to claim 1 and 2, characterized in that A and/or X are/is H.

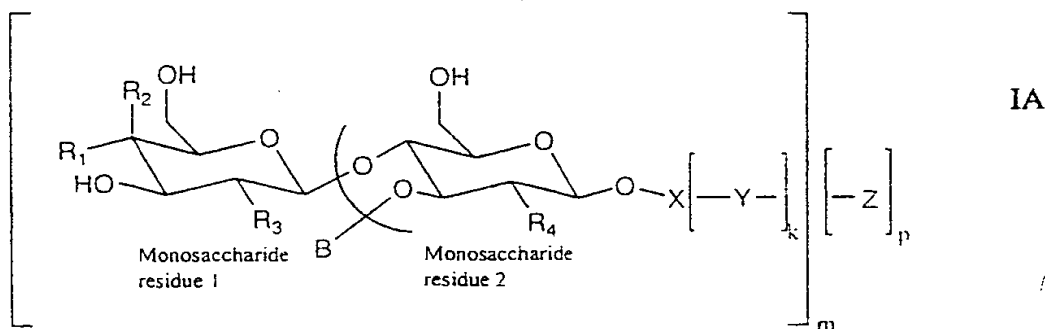
10 *SW 02* 4. The oligosaccharides according to claim 1, 2 or 3, characterized in that monosaccharide 1 is Glc or GlcNAc.

15 5. The oligosaccharides according to claim 1, characterized in that X is an oligosaccharide containing from 2 to 10 monosaccharide units, the monosaccharide units being glucosidically  $\beta$ 1-4 or  $\beta$ 1-3 linked Glc or GlcNAc residues.

6. The oligosaccharides according to claim 1, characterized in that m is 1 to 100, preferably 1 to 10, and n is 1 to 10.

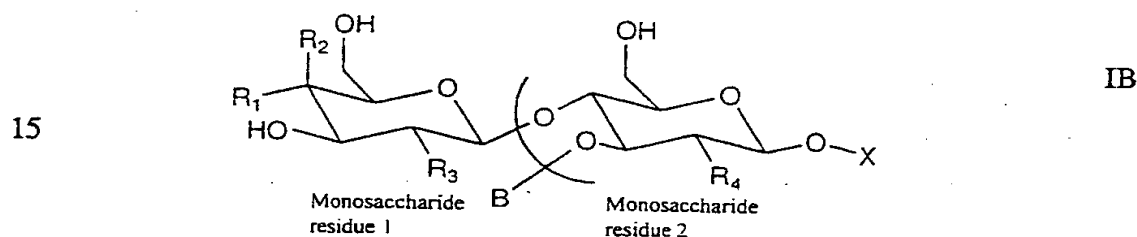
20 7. The oligosaccharides according to claim 1, characterized in that X is an aglycon group selected from lower alkyl or alkenyl group 1 to 7, or 2 to 7 carbon atoms, respectively, or a phenyl or benzyl group, or 4-methylumbelliferyl.

25 8. The oligosaccharides according to claim 1, characterized in that they have the formula

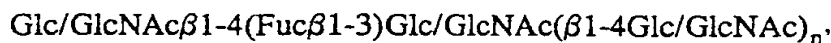


wherein the symbols have the meanings given in connection with the formula I in claim 1, preferably the monosaccharides 1 and 2 are independently Glc and GlcNAc, B is L-fucosyl, and X is Glc or GlcNAc or a  $\beta$ 1-3 or  $\beta$ 1-4 linked oligomer comprising up to 10 units of Glc and/or GlcNAc.

9. The oligosaccharides according to claim 1, characterized in that A is H and the monosaccharides 1 and 2 are independently Glc, or GlcNAc, B is L-fucosyl,  $p, k = 0$  and  $n = m = 1$ , and X is Glc or GlcNAc or a  $\beta$ 1-3 or  $\beta$ 1-4 linked oligomer comprising up to 10 units of Glc and/or GlcNAc having the formula



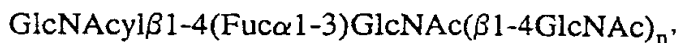
- 20 10. The oligosaccharides according to claim 1 having the formula



wherein  $n'$  is the integer 1 to 8, preferably 1 to 6.

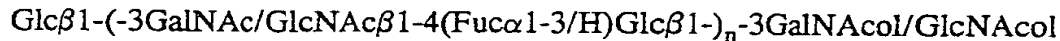
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11. The oligosaccharides according to claim 1 having the formula



- 30 wherein  $n'$  has the meaning given above and acyl is an alkanoyl group which preferably contains 8 to 24 carbon atoms and 1 to 3 double bonds.

12. The oligosaccharides according to claim 1, characterized in that  $1 \leq n \leq 1000$ , monosaccharide residue 1 is GlcNAc or GalNAc and monosaccharide residue 2 is optionally fucosylated Glc, such as the compound



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13. A process for the preparation of the oligosaccharides according to claim 1, characterized in that a compound of the formula I wherein B is always H, is fucosylated with donor nucleotide sugar containing L-fucose, or an analogue thereof, in the presence of a fucosyl transferase enzyme, and the fucosylated saccharide so prepared is optionally recovered.

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14. The process according to claim 13, characterized in that the fucosyltransferase is mammalian  $\alpha 1-3$  or  $\alpha 1-3/4$  fucosyltransferase.

15 15. The process according to claim 13 or 14, characterized in that a N-acetyl-chitooligosaccharide is used as the starting material.

*Ins*  
*Q3*  
20 16. The process according to any one of claims 13 to 15, characterized in that the donor nucleotide sugar containing L-fucose is GDP-L-fucose.

17. The process according to any one of the claims 14 to 16, characterized in that the fucosyltransferase is human  $\alpha 1-3$  fucosyltransferase or  $\alpha 1-3/4$  fucosyltransferase III-VII, IX or  $\alpha 1-3/\alpha 1-3/4$  fucosyltransferase of human milk.

25 18. The process according to any one of the preceding claims 13 to 17, characterized in that it comprises the further step of reacting the product obtained with the formula I with  $\beta$ -N-acetyl-hexosaminidase.